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DEPARTMENT OF
WATER RESOURCES

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SPF WATER ENGINEERING

MEMORANDUM

DATE: May 16, 2011

TO: Steve Lester
Idaho Department of Water Resources

FROM: Christian Petrich, Ph.D., P.E., P.G.

SPF File: 329.0051

RE: *Application for Permit 61-12256 – Response Regarding Water Supply and Availability*

A. Introduction

The Intermountain Sewer & Water Corporation submitted Application for Permit 61-12256 on January 17, 2008 seeking authorization to divert up to 13.76 cfs for municipal purposes. The Idaho Department of Water Resources (IDWR) requested information on March 16, 2010 regarding the (1) availability of an "adequate, sustainable ground water supply," (2) potential impacts to the Mountain Home Ground Water Management Area (GWMA) and Cinder Cone Butte Critical Ground Water Area (CGWA), (3) ground-water level monitoring and reporting, and (4) cumulative effects of ground-water development in the vicinity of points of diversion for Application 61-12256.

This memorandum provides initial responses to IDWR questions. Additional data are actively being collected by IDWR, the applicant, and other water users (see below). These new data will provide additional insight regarding water availability and supply. A more detailed water-supply analysis will be submitted on the basis of the anticipated new information at a later date.

The following section lists conclusions from this review. Section C provides background information on Application for Permit 61-12256 and projected annual water use. Section D addresses adequacy of supply; the potential impacts to the Mountain Home GWMA and the Cinder Cone Butte CGWA are discussed in Section E. Anticipated monitoring plan components are listed in Section F; potential cumulative effects are considered in Section G.

B. Summary and Conclusions

Conclusions from this analysis include the following:

1. The projected annual water demand under Application for Permit 61-12256 will be approximately 2,650 acre-feet. This estimate is based on an anticipated 4,200 residential units and 840 equivalent domestic units

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(representing commercial, industrial, and miscellaneous uses). Irrigation under this application would be limited to 0.084 acres per residential unit; commercial, institutional, and common spaces will be irrigated with reclaimed domestic wastewater.

2. A water-supply assessment prepared for the Mayfield Springs Planned Community (SPF, 2007) suggested that there are approximately 8,600 to 32,600 acre-feet of recharge in the potential capture zone surrounding the Mayfield Springs Planned Community in an average year.
3. The combined projected annual withdrawal for approved permits and applications (for which annual withdrawal estimates are available) in the vicinity of the Mayfield Springs Planned Community is approximately 7,240 acre-feet per year. This volume is less than the estimated recharge to the projected Mayfield Springs capture zone area.
4. The aggregate volume estimate listed above (7,240 acre feet per year) does not include annual volume estimates for Applications 63-32499, 61-12095, and 61-12096 (these data are not yet available). We expect that these volume estimates will be available closer to the time that Application 61-12256 is processed.
5. The applicant anticipates updating the 2007 water budget prepared for the Mayfield Springs Planned Community based on new data and information that are not yet available. Specifically, the water budget update will be based on new geological mapping, new interpretations of geophysical information, streamflow measurements in Indian Creek and Indian Creek Reservoir, new water-level data, anticipated geochemical data, and test data from one or more Mayfield Springs wells.
6. Ground water levels are generally stable in the Mayfield Springs Planned Community area, indicating that local aquifers are capable of sustaining additional withdrawals.
7. Water levels in wells within the Mountain Home GWMA near the Mayfield Springs Planned Community show no response to approximately 40 years of pumping in the Cinder Cone Butte CGWA. As such, it is unlikely that modest pumping in the Mayfield Springs Planned Community will have a substantial impact on ground water levels within the Cinder Cone Butte CGWA.
8. The applicant will submit a water-level monitoring plan to IDWR following the approval of Application for Permit 61-12256. The plan will identify monitoring wells, describe measurement frequencies, and outline reporting to IDWR. Anticipated components of this plan are outlined in this memorandum.
9. Cumulative effects of ground water development in the Mayfield Springs Planned Community area will be further evaluated upon (a) analysis of the above-listed new data and information and (b) availability of projected annual withdrawals under applications for which this information is not yet available.

C. Background

The proposed Mayfield Springs Planned Community covers approximately 1,600 acres in eastern Ada County and western Elmore County. The Mayfield Springs Planned Community is shown in Figure 1. A site map is shown in Figure 2.

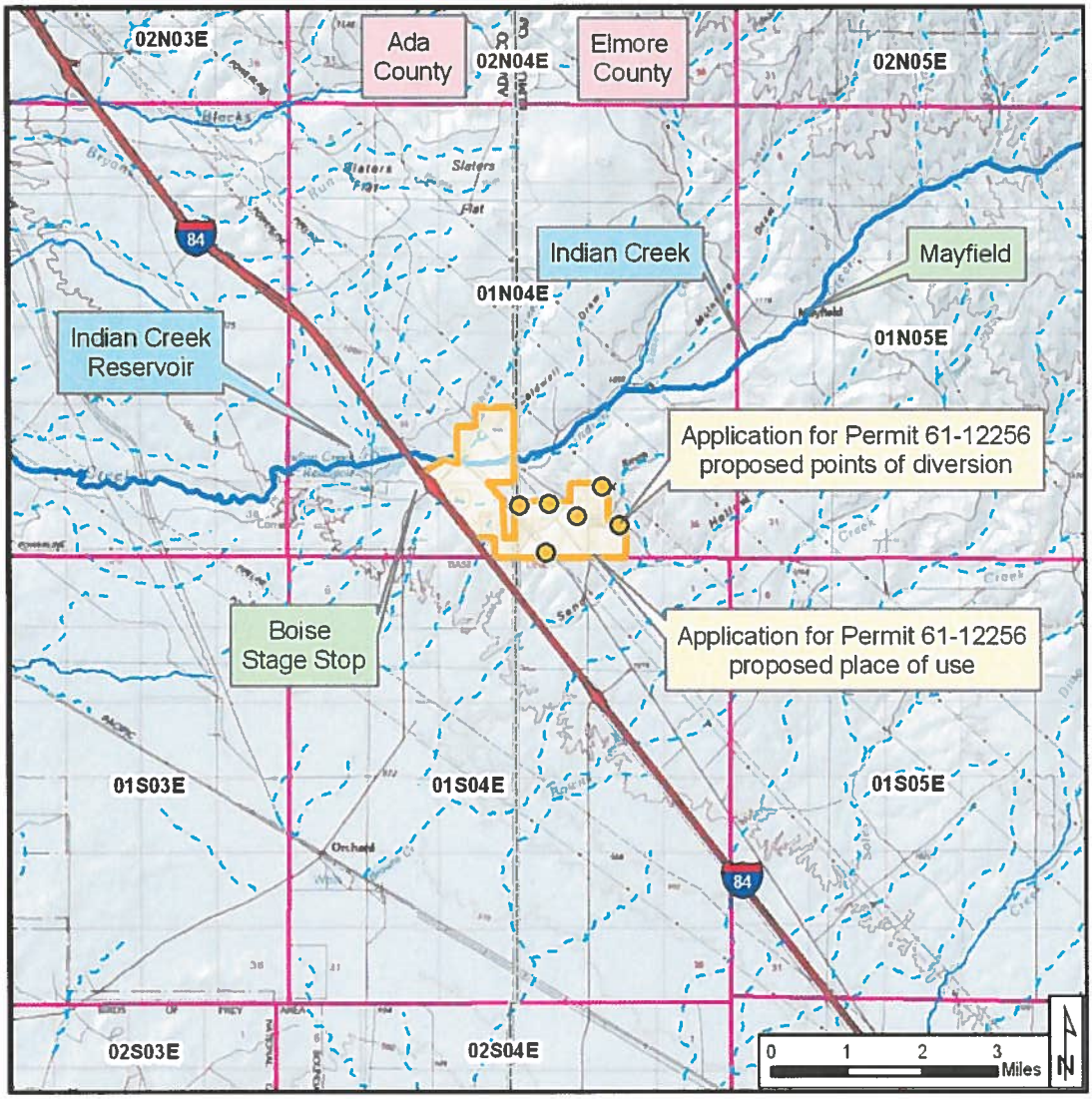

Figure 1. Vicinity map.

IDWR previously issued Permit 63-32225 to the Intermountain Sewer and Water Corporation (Intermountain) authorizing a maximum diversion of 10 cfs and an annual volume limit of 1,815 acre-feet per year (AFA) for municipal purposes in the vicinity

proposed planned community. Permit 63-32225 was proposed to serve 2,000 homes and associated commercial use. Points of diversion for Permit 63-32225 will be located in the Ada County portion of the Mayfield Springs Planned Community (within Administrative Basin 63).

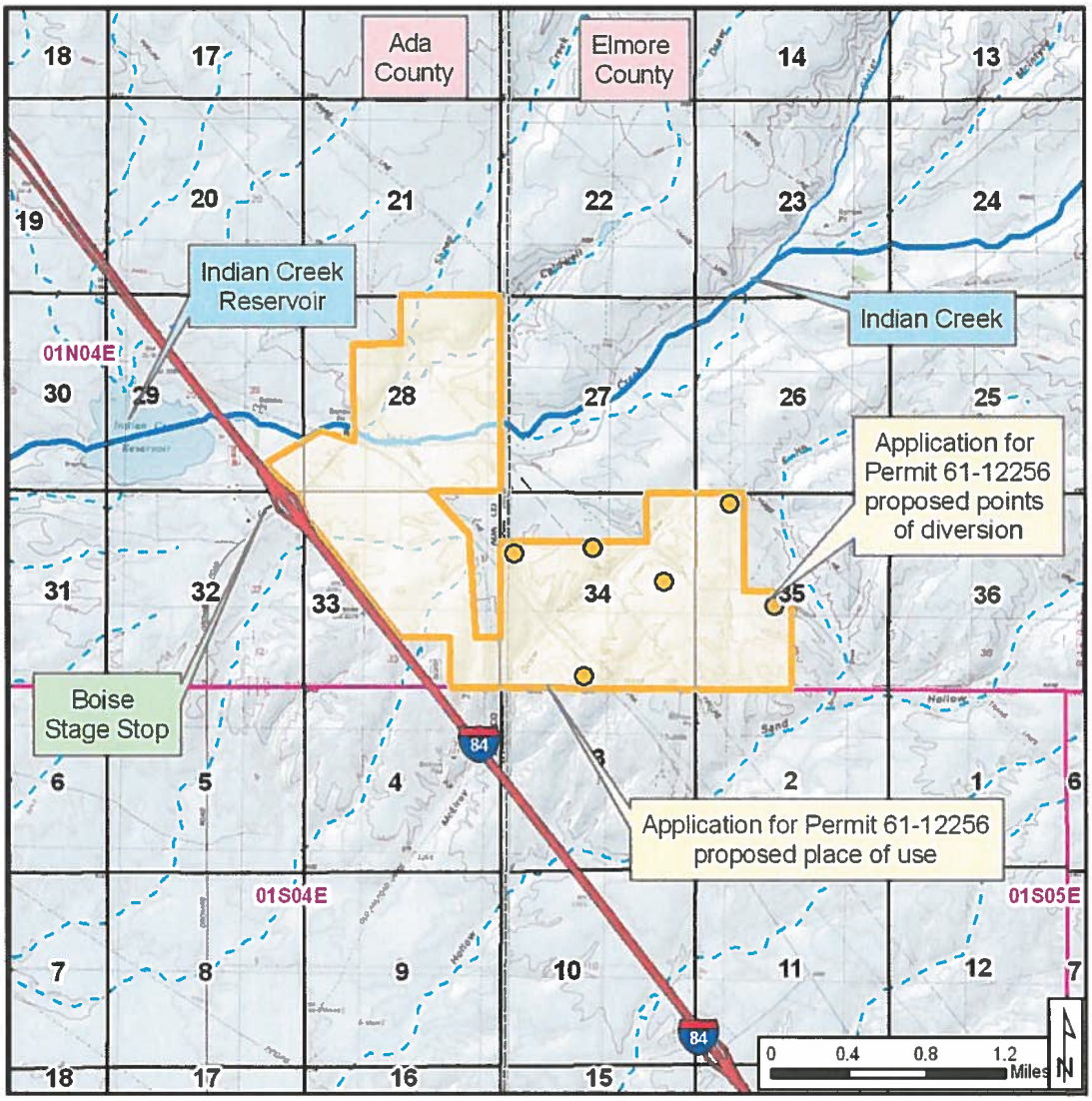

Figure 2. Property map.

Application for Permit 61-12256 was filed by Intermountain on January 17, 2008 to supply potable water and limited residential landscape irrigation for an additional (1) 4,200

homes and (2) associated commercial and industrial uses. Points of diversion proposed by Application 61-12256 are located in Elmore County, within Administrative Basin 61.

The proposed place of use for Application 61-12256 is within the boundary of the Mayfield Springs Planned Community in Ada County and Elmore County, Idaho, which lies within Sections 28, 29, 32, 33, 34 and 35, Township 1N, Range 4E, B.M. (Figure 2). A total of six points of diversion (i.e., wells) are proposed in Sections 34 and 35, Township 1N, Range 4E, B.M.

The projected water demand for the uses described in Application 61-12256 is approximately 2,650 acre-feet per year (Table 1, page 6). This volume is based on an assumed 4,200 residential units per year with commercial and industrial use represented by an additional 840 equivalent domestic units (20% of residential units) and an assumed domestic water use of 250 gallons per day per unit. This application includes residential irrigation only, estimated at 0.084 acres per residential and equivalent domestic unit (for a total of 353 acres), and an assumed annual irrigation demand of 3.5 acre-feet per acre (water-efficient landscaping will likely result in a lower per-acre irrigation demand). Commercial, institutional, and common areas will be irrigated with treated wastewater. The amount of treated wastewater generated at full build-out (assuming that 85% of the domestic water use is treated and available for reuse) will be approximately 1,200 acre-feet, sufficient for approximately 344 acres at an application rate of 3.5 feet per acre. Any water not reused for irrigation will become deep percolation (i.e., recharge) to the local aquifer system.

D. Adequacy of Supply

This section provides responses to IDWR questions in the same order (and refer to the same question numbers) as those listed in the March 16, 2010 letter.

IDWR Question #4: Demonstrate an adequate, sustainable ground water supply is available, and demonstrate the proposed use of ground water will not result in further ground water level declines in the Mountain Home Ground Water Management Area or the Cinder Cone Butte Critical Ground Water Area.

Sustainable Supply

SPF previously prepared a water-supply assessment for the Ada County portion of the Mayfield Springs Planned Community (SPF, 2007). SPF concluded in this assessment that there are approximately 8,600 to 32,600 acre-feet of recharge to a potential capture zone in the vicinity of the proposed Mayfield Springs Planned Community in an average year. This recharge occurs as a result of areal infiltration from precipitation, seepage from surface-water channels carrying runoff from the Danskin Mountains, and underflow from the Danskin Mountains.

Parameter	Value	Units
Domestic use		
Number of residential units	4,200	
Assumed commercial, industrial, and miscellaneous use (as a percentage of residential units)	20	percent
Number of equivalent residential units (representing commercial, industrial, and miscellaneous uses)	840	
Total residential and equivalent domestic units	5,060	
Assumed domestic water use per day per unit	250	Gallons
Projected total annual domestic water use	1,417	Acre-feet
Residential irrigation use		
Assumed irrigated area per residential and equivalent domestic unit	0.084	Acres
Total residential irrigation area (does not include irrigation for commercial and common spaces)	353	Acres
Projected irrigation demand (per acre)	3.5	Acre-feet/acre
Projected total irrigation demand	1,235	Acre-feet/acre
Combined domestic and residential irrigation water demand		
Total average annual projected water demand	2,652	Acre-feet
Commercial, institutional, and common-space irrigation		
Assumed percentage of treated wastewater available for common-space irrigation	85	Percent
Maximum volume of water available for commercial, institutional, and common-space irrigation (based on an application rate of 3.5 feet per acre); it is assumed that any reclaimed water not used for irrigation will be returned to the underlying aquifer system	1,204	Acre-feet
Estimated commercial, institutional, and common area irrigated with reclaimed wastewater	344	Acres

Table 1. Projected consumptive water use.

Diversions in 2007 within the Mayfield Springs capture zone (Figure 3) were estimated to be approximately 700 acre-feet per year (SPF, 2007). Permit 63-32225 authorizes a maximum annual withdrawal of 1,815 acre-feet for the Mayfield Springs Planned Community. Application for Permit 61-12256 will require an additional 2,700 acre-feet per year for the Mayfield Springs Planned Community. These combined volumes (5,215 acre-feet per year) are less than the recharge range projected in 2007 (SPF, 2007).

These volumes do not include additional existing or planned withdrawals in the Mayfield Springs capture zone, which are addressed in Section G.

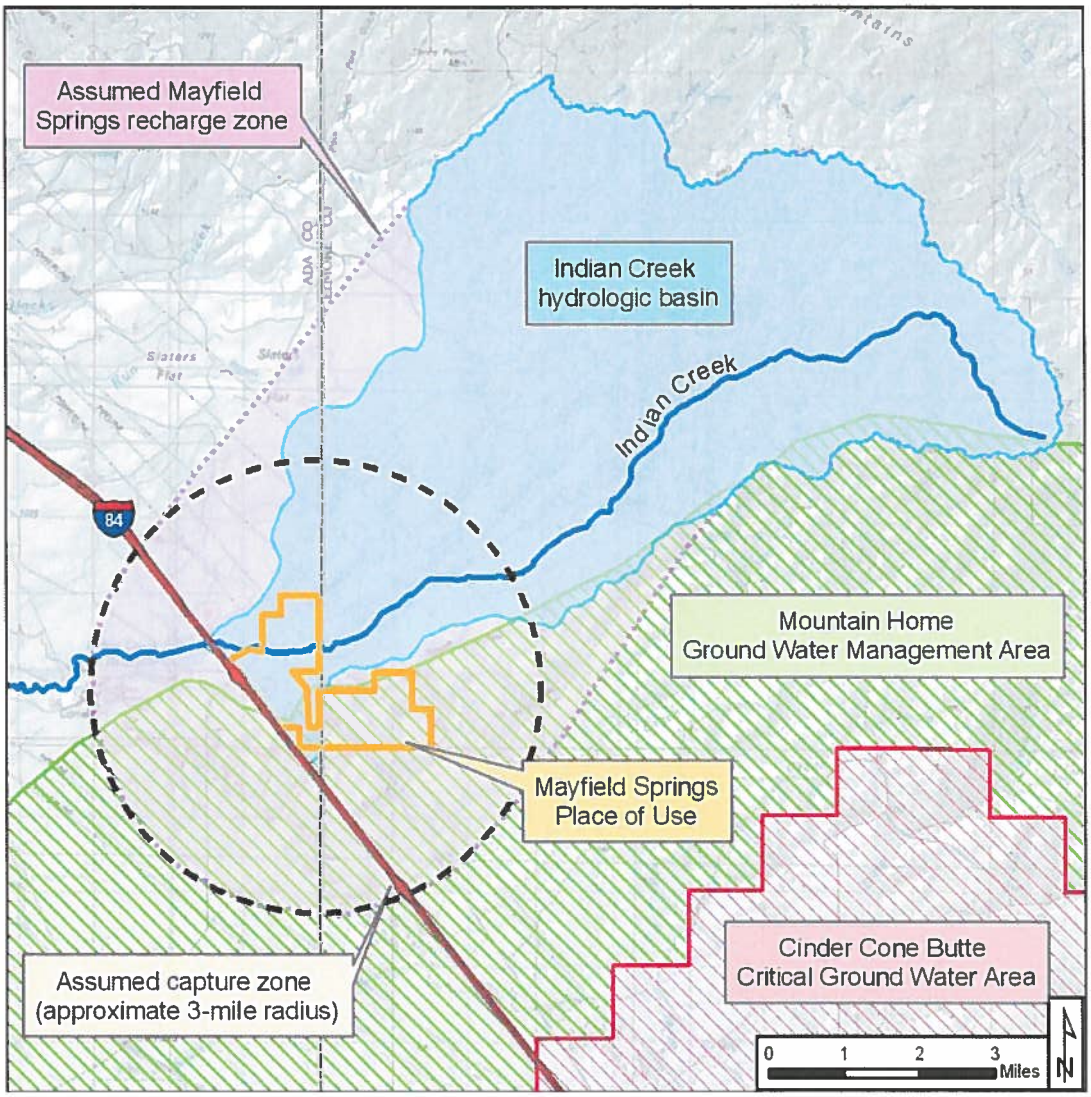

Figure 3. Capture zone and tributary area to wells in the Mayfield Springs area (based on analysis for Permit 60-32225, SPF, 2007).

New data are currently being collected that will help enable refinement of the projected recharge estimates for the Mayfield Springs area. First, the applicant has completed Idaho Department of Environmental Quality (IDEQ) permitting for a new public water system supply well. Drilling of an initial test well is scheduled to begin this month. We

anticipate that the test well will be followed by the drilling and construction of a public water supply well.

Second, the Idaho Geological Survey (IGS) is conducting geological mapping of the East Ada and Western Elmore County areas. An IGS report summarizing findings is due in June 2011. Information from this report may enable additional refinement to our conceptual model of aquifer recharge in the Mayfield Springs area.

Third, the Center for Geophysical Investigation of the Shallow Subsurface (CGISS) at Boise State University (BSU) has released a draft report summarizing geophysical characterization of the East Ada County area, but continues to do additional analysis and interpretation. A final report is due in 2011. This report may provide additional information about ground water flow in the Mayfield Springs vicinity.

Next, the U.S. Geological Survey (USGS), under contract with IDWR, is measuring streamflow in surface channels near the Mayfield Springs property. Streamflow gaging stations have been installed at Indian Creek at Mayfield Bridge, Indian Creek just above the Indian Creek Reservoir, and Bowns Creek. In addition, the USGS is recording water levels in – and seepage from – Indian Creek Reservoir. However, these data are not yet available. At the time of this writing, streamflow data are available for Indian Creek at Mayfield Bridge for 2010 and 2011 (Figure 4). Streamflow data from Bowns Creek are available for 2010 (figure), but 2011 data have not yet been processed. The stream gage at Indian Creek above Indian Creek Reservoir recorded 2011 flows (which have not yet been released by the USGS); there was no flow in this channel in 2010. These data, when available, will enable development of refined recharge estimates in the Mayfield Springs area.

Finally, the USGS, under contract with IDWR, is planning a geochemistry analysis of water from wells in the Mayfield Springs vicinity. This information may provide insight into recharge mechanisms and ground water flow patterns.

In summary, the proposed annual diversion under Application for Permit 61-12256 and other known annual diversions (see also Section G) – a total of approximately 6,300 acre-feet per year (based on currently available information) – are less than the estimated range of average recharge (8,600 to 32,600 acre-feet per year) estimated in 2007 (SPF, 2007). The applicant intends to provide an updated estimate of sustainable water supply pending the outcome of current data collection efforts.

Impact to Ground Water Levels

Ground-water levels continue are stable in the vicinity of the Mayfield Springs area (Figure 5 and Attachment A). Of the 12 wells from which recent water-level data are available, 9 wells show stable water levels, one well (01N04E-32BB1) experienced a decline of approximately 14 feet, and 3 wells experienced modest water-level increases. Of the wells showing increases, 2 wells are northeast of Mayfield (01N05E-08CDD1 and 01N05E-17BCA1) are shallow wells in which water level increases reflect shallow-aquifer recharge. Water levels in the third well (01S04E-10DAD1, which has an open interval

between 496 and 525 feet below ground surface) have increased approximately 6 feet since the late 1980s. This well is located in the Mountain Home GWMA between Mayfield Springs and the Cinder Cone Butte CGWA. The single well that experienced a water level decrease (Well 01N04E-32BB1) is a relatively shallow well with an open interval between 19 and 160 feet below ground surface – this well does not reflect water levels in the regional aquifer targeted by Mayfield Springs production wells.

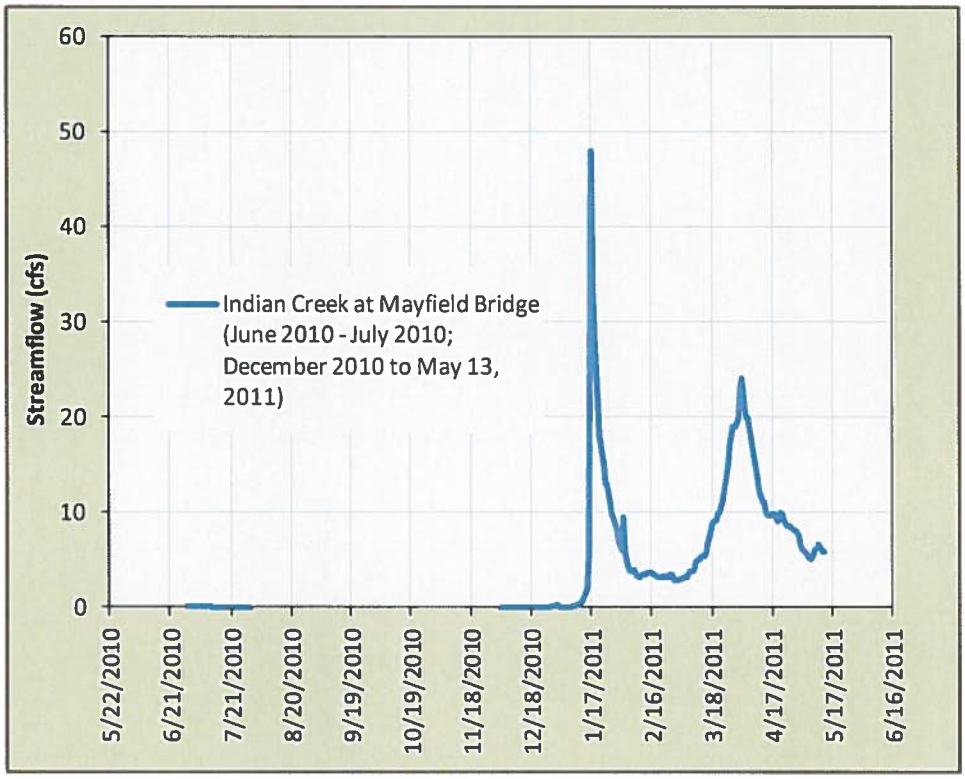

Figure 4. Indian Creek at Mayfield Bridge (provisional USGS data).

Water levels in the Mayfield Springs Planned Community area are stable (or increasing slightly). Stable water levels indicate water available for appropriation.

Pumping tests in the first Mayfield Springs production well (and in at least one additional nearby production well) will provide initial aquifer parameter estimates for the Mayfield Springs area. These data are needed for evaluating impacts to local ground water levels as a result of Mayfield Springs production. More detailed analysis of potential impacts to local ground water levels will be prepared following the analysis of the anticipated well test information.

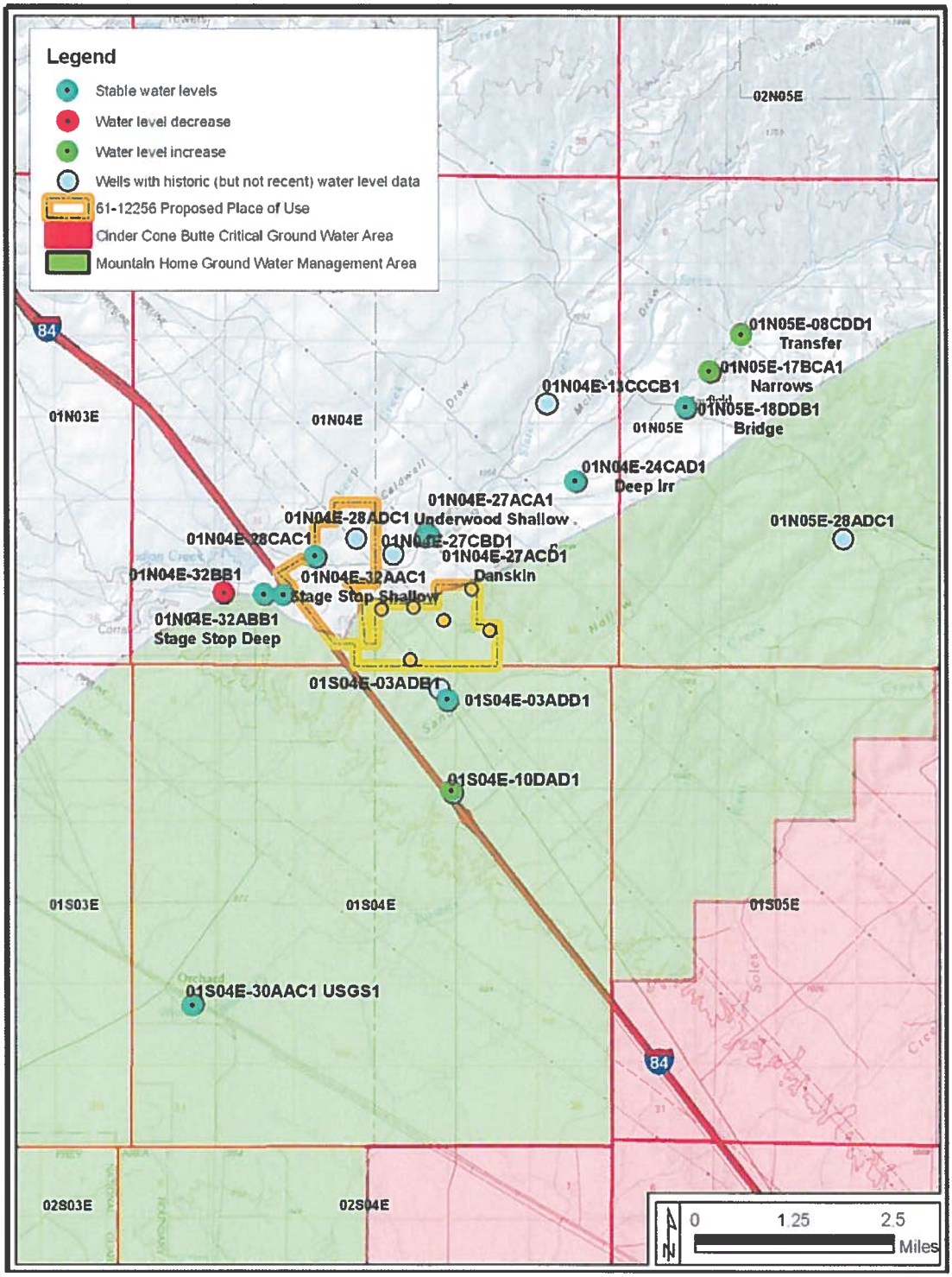

Figure 5. Summary of ground-water level trends.

E. Impacts to Management Areas

(5) The proposed wells are within the Mountain Home Ground Water Management Area (GWMA) and not far from the Cinder Cone Butte Critical Ground Water Area (CGWA). Demonstrate the proposed use of ground water will not result in further groundwater level declines in the GWMA and the CGWA.

Water levels in the Mayfield Springs Plan Community area are stable (or increasing slightly). Pumping in the Cinder Cone Butte CGWA for approximately 40 years has not affected water levels in the Mayfield Springs area. It therefore seems unlikely that modest pumping in the Mayfield Springs area will substantially impact water levels in the CGWA. However, water-level responses to aquifer tests planned in the initial Mayfield Springs production well, and anticipated pumping from a new production well located southeast of the Mayfield Springs property (authorized under Permit 61-12090), will provide additional insight regarding potential water-level impacts to nearby administrative areas. Specifically, results from new pumping and well tests will yield aquifer parameter estimates for assessing potential water-level impacts from new pumping.

F. Monitoring Plans

(6) Discuss plans to monitor and report data about ground water supply, ground water levels, and ground water quality in and around the project area if 61-12256 is approved and development proceeds.

The Applicant understands the importance of monitoring and reporting data about ground water supply, ground water levels, and ground water quality. A monitoring plan will be prepared following the approval of Permit 61-12256. A similar plan is required for Permit 63-32225. We anticipate that the monitoring plan will include the following components:

1. Installation of pressure transducers and dataloggers in test and production wells, recording water levels every six hours for the first year, with re-evaluation of measurement frequency thereafter.
2. Installation of a barometric pressure recorder in at least one location, recording pressure readings every six hours for the first year, with reevaluation of measurement frequency thereafter.
3. Installation of flowmeters on all production wells to record discharge over the first year, with re-evaluation thereafter. The flowmeters will meet IDWR's minimum acceptable standards for measurement and reporting of surface and groundwater diversions.
4. Collection of monthly hand measurement of water levels for the first year, with re-evaluation of measurement frequency thereafter.
5. Submittal of initial water-quality data collected as part of IDEQ permitting for a public water supply system.
6. Submittal of an annual report to IDWR that includes:

a. Analysis of water level trends in the production well, test well, and nearby wells;

b. Reporting of discharge rates over time and analysis in relation to water levels;

c. Electronic records of water level and discharge data.

G. Cumulative Effects

(7) Discuss the cumulative effects of ground water development under the existing permit (63-32225), this new application (61-12256), and all projects senior in priority to 61-12256 in the so-called "I-84 Corridor".

Active applications and approved permits for ground water project in the I-84 area with priority dates senior January 17, 2008 (the priority date for Application for Permit 61-12256) are listed in Table 2. The combined maximum diversion rate for these permits and applications is 84.22 cfs. It is very unlikely that pumping under these permits and applications will occur at the maximum rate for an extended period of time or at the same time. This aggregate diversion rate is therefore not particularly useful for evaluating long-term cumulative pumping effects.

Cumulative effects are best evaluated using annual withdrawal volumes. The 2007 diversions were estimated at 700 acre-feet (SPF, 2007). An annual volume of approximately 2,650 acre feet is anticipated for Application 61-12256. Annual maximum volumes have been established for two of the I-84 permits: Permit 63-32225 (Intermountain Sewer & Water Corp.) is limited to 1,815 acre-feet per year and permit 61-12090 (Nevid LLC) is limited to 345 acre-feet per year. In addition, pending Application 63-32703 could result in an eventual permit for 1,680 acre-feet per year (based on an assumed irrigation application of 3.5 feet[1] per acre over 480 acres). The aggregate annual diversion volumes for these existing rights, existing permits, and pending applications (for which annual volumes have been estimated) is approximately 7,240 acre-feet (700+1,815+3,45+1,680+2,700). This amount is less than the range of recharge estimated for the Mayfield Springs area in 2007.

The diversion volumes for the remaining applications or transfers (Transfer 73834 and Applications 63-32499, 61-12095, and 61-12096) have not yet been established. Furthermore, it is not yet certain that all of these approved permits and applications (if approved) will be licensed for permitted amounts. The actual annual volumes withdrawn from the aquifer may, in aggregate, be less than currently-requested or permitted amounts.

[1] The actual application rate will likely be less

However, the annual volume of 7,240 acre-feet does not include volumes for Applications 63-32499 (Mayfield Townsite LLC), 61-12095 (Nevid LLC) and 61-12096 (Nevid LLC) – annual volumes for these applications have not yet been established. Each of these applications has a priority date senior to that of Application 61-12256. IDWR has indicated a reluctance to process applications out of priority. Thus, it is almost certain that estimates of annual volumes will be available for all of these applications by the time that Application 61-12256 is actually processed. These aggregate annual volumes will be compared to the refined estimates of recharge and water availability described in Section D.

Applicant	Water Right No.	Priority Date	Water Use	Diversion Rate (cfs)	Diversion Volume (afa)	Status
Orchard Ranch LLC	61-7263	1976*	Irrigation	11.36	??	Not Advertised
Intermountain Sewer & Water Corp.	63-32225	9/16/2005	Municipal	10.00	1,815	Permit Issued
Mayfield Townsite LLC	63-32499	7/28/2006	Municipal	10.00	??	Protested
Nevid LLC	61-12090	9/28/2006	Municipal	4.02	345	Permit Issued
Nevid LLC	61-12095	4/3/2007	Municipal	5.00	??	Protested
Nevid LLC	61-12096	4/3/2007	Municipal	20.48	??	Protested
Orchard Ranch LLC	63-32703	6/21/2007	Irrigation	9.60	1,440	Advertised, permit pending, assumed volume based on acreage
Intermountain Sewer & Water Corp.	61-12256	1/17/2008	Municipal	13.76	2,700	Not Advertised
Total				84.22		

* successful transfer of this right will likely result in subordination to rights, permits, and applications with priority dates senior to the date on which the transfer was filed.

Table 2. Applications and permits for new ground water withdrawals in the I-84 corridor.

Ground water withdrawals under the applications and permits with priority dates senior to that of Application 61-12256 will create cones of depression around the pumping wells – this is physically necessary to induce flow toward production wells. Some cones of depression among wells authorized under these I-84 applications and permits may overlap. It will be possible to better project the magnitude and areal extent of these

aggregate cones of depression once initial production pumping under these applications and/or permits begins.

H. References

SPF, 2007. Water Supply Assessment for the Mayfield Springs Planned Community, Consulting report prepared prepared by SPF Water Engineering, LLC for Intermountain Sewer and Water Corporation.

Attachment A: Water Level Plots

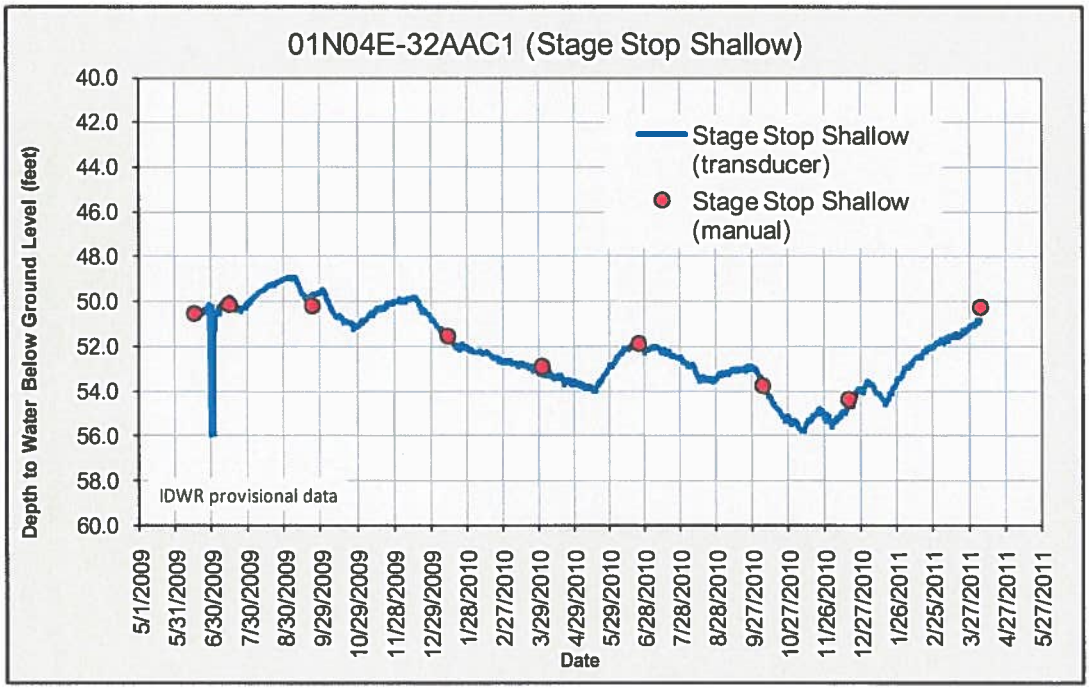

Figure 6. Well 01N04E-32AAC1 (interpreted short-term stable water level)

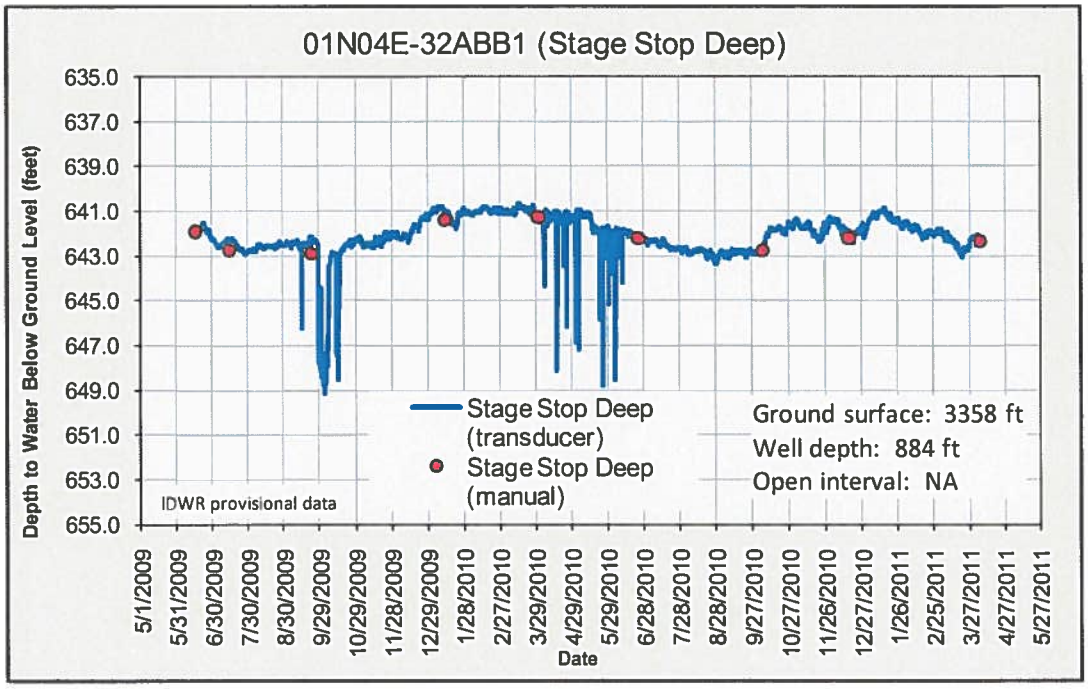

Figure 7. Well 01N04E-32ABB1 (interpreted short term stable water level).

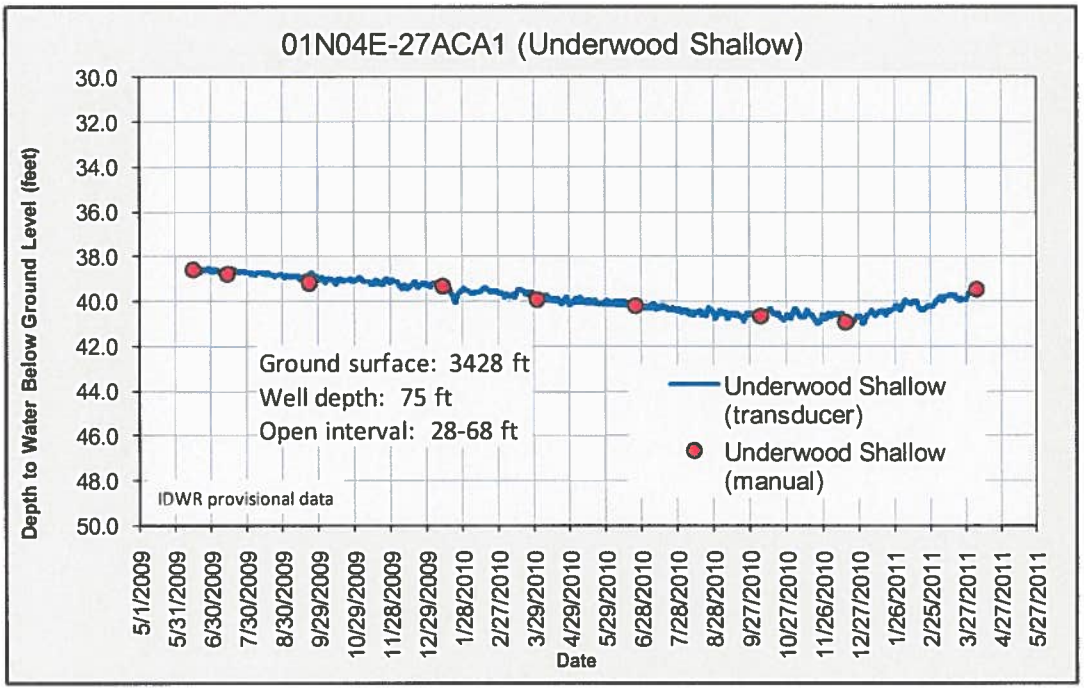

Figure 8. Well 01N04E-27ACA1 (interpreted short-term stable water level)

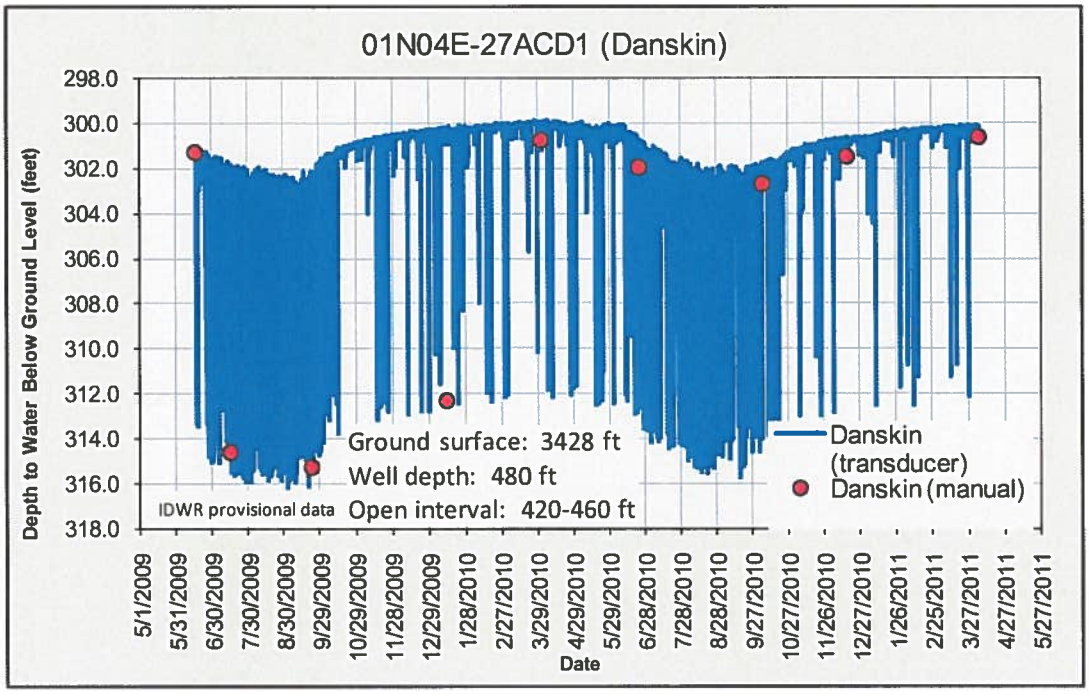

Figure 9. Well 01N04E-27ACD1 (interpreted short-term stable water level).

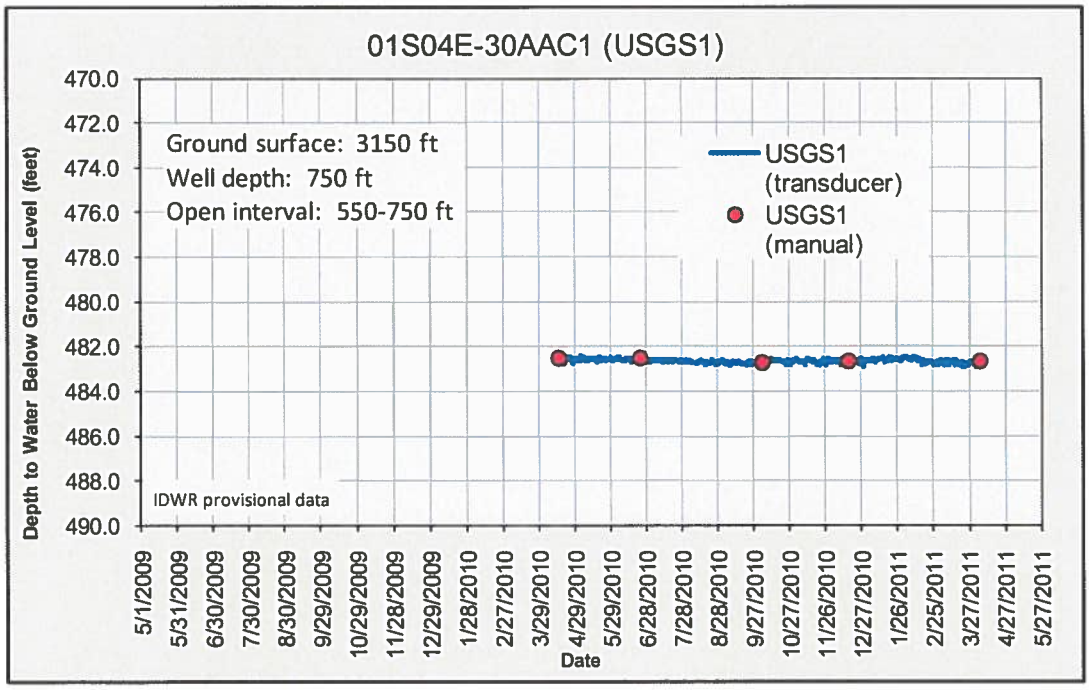

Figure 10. Well 01S04E-30AAC1 (interpreted short-term stable water level).

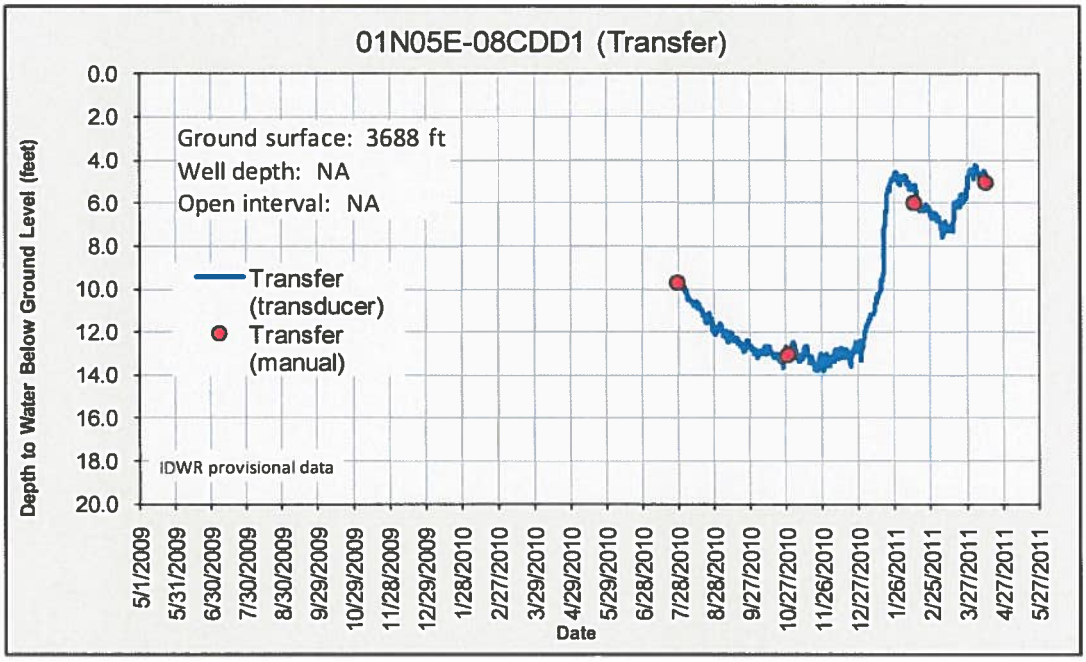

Figure 11. Well 01N05E-08CDD1 (interpreted short-term increasing water level).

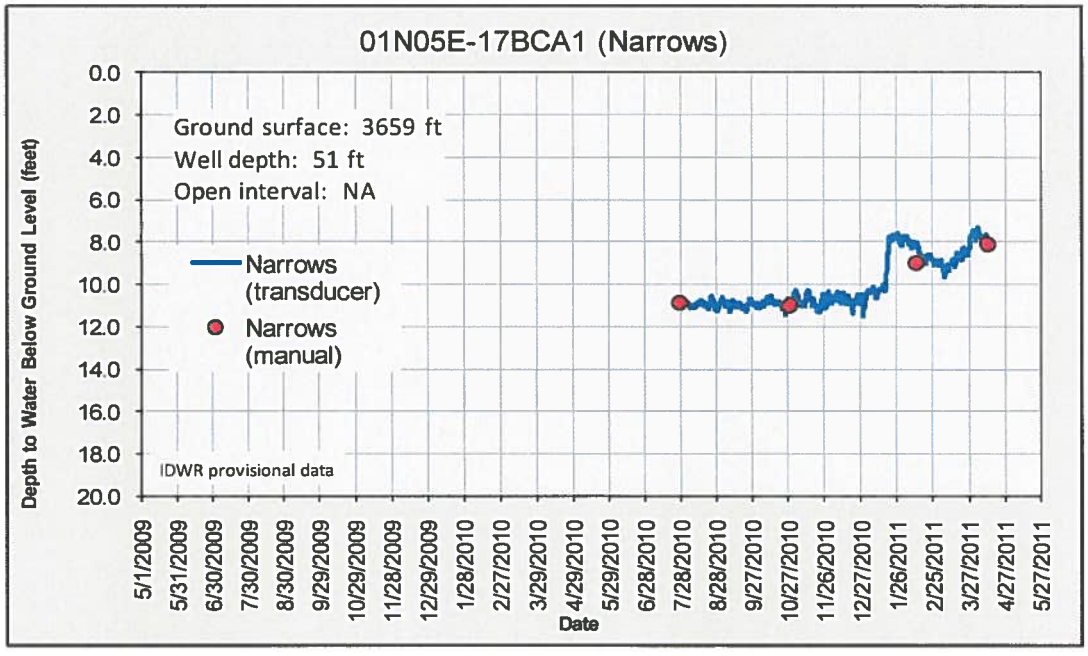

Figure 12. Well 01N05E-17BAC1 (interpreted short-term increasing water level).

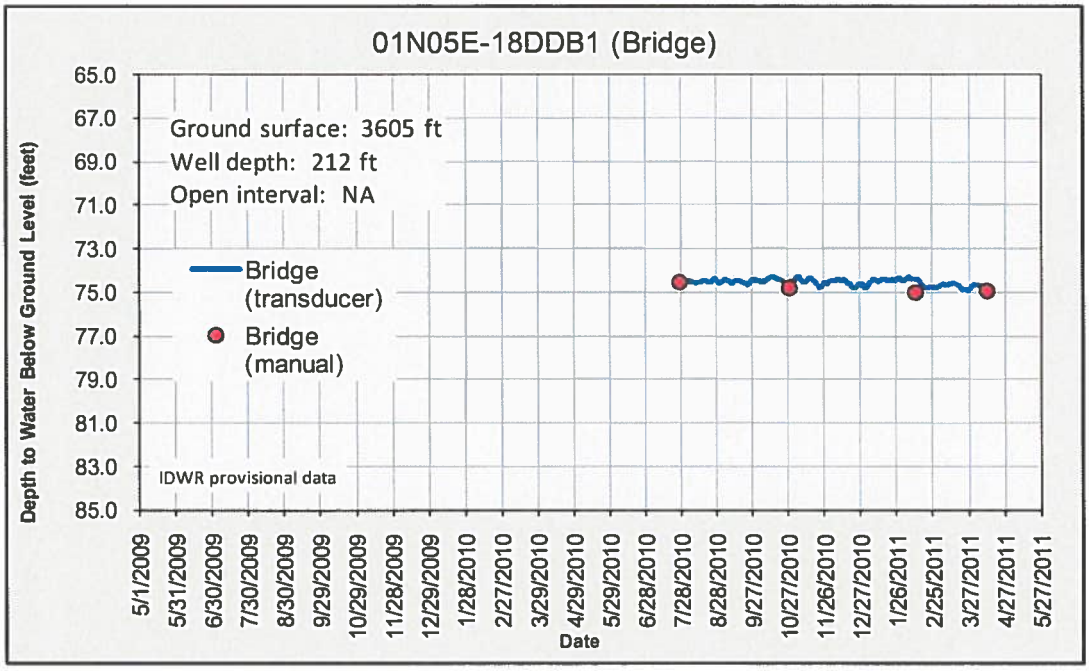

Figure 13. Well 01N05E-18DDB1 (interpreted short-term stable water level).

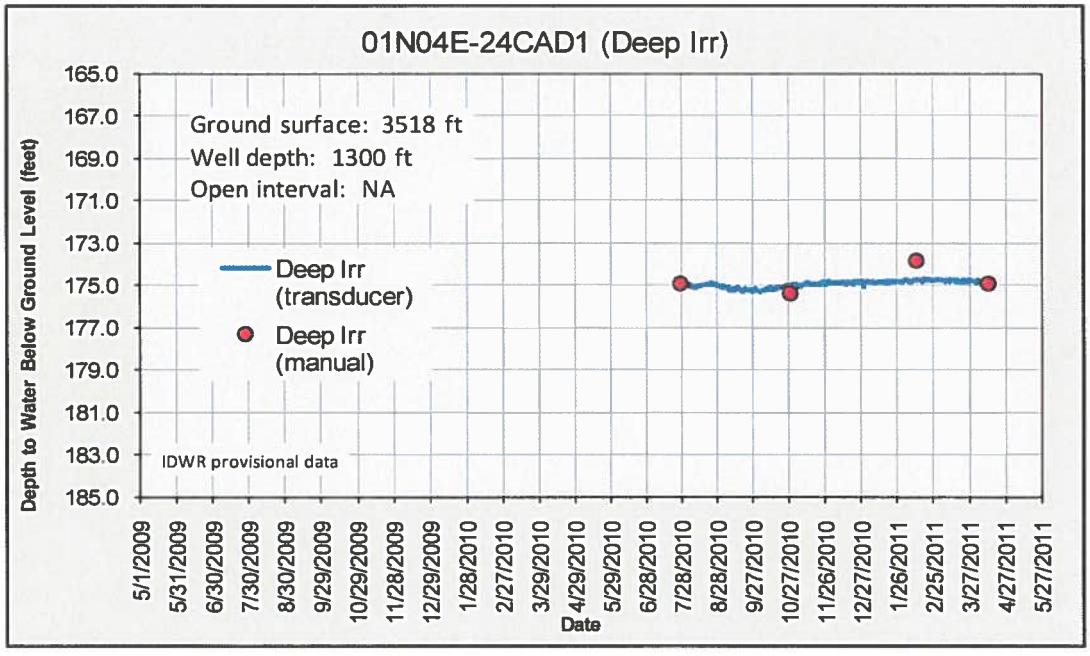

Figure 14. Well 01N04E-24CAD1 (interpreted short-term stable water level).

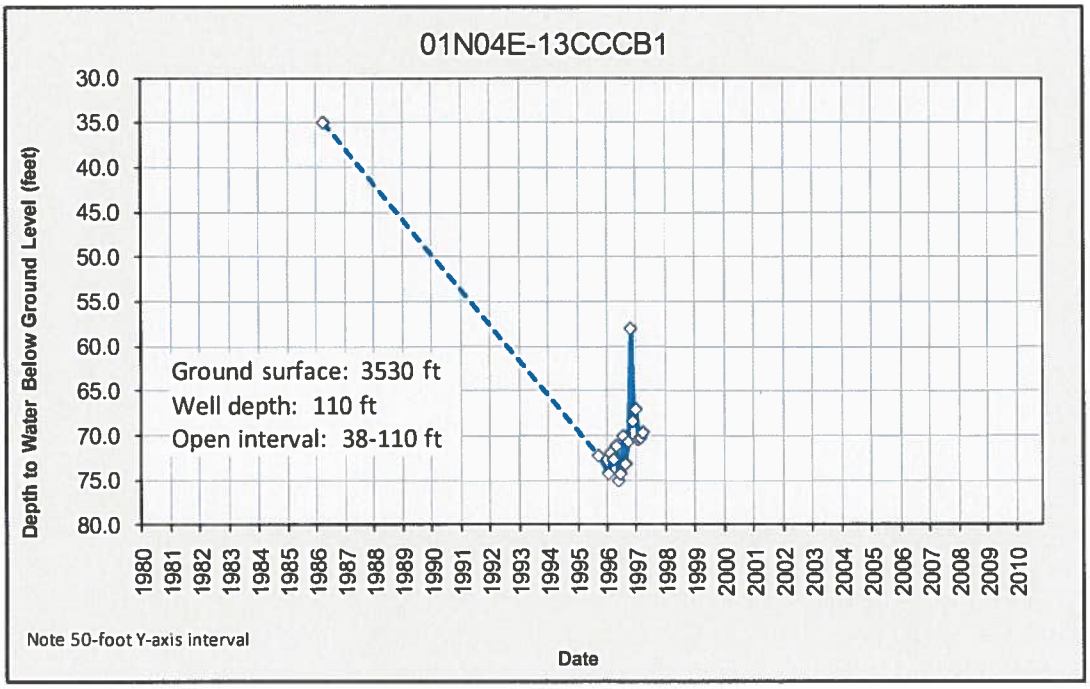

Figure 15. Well 01N04E-13CCCB1 (no recent data).

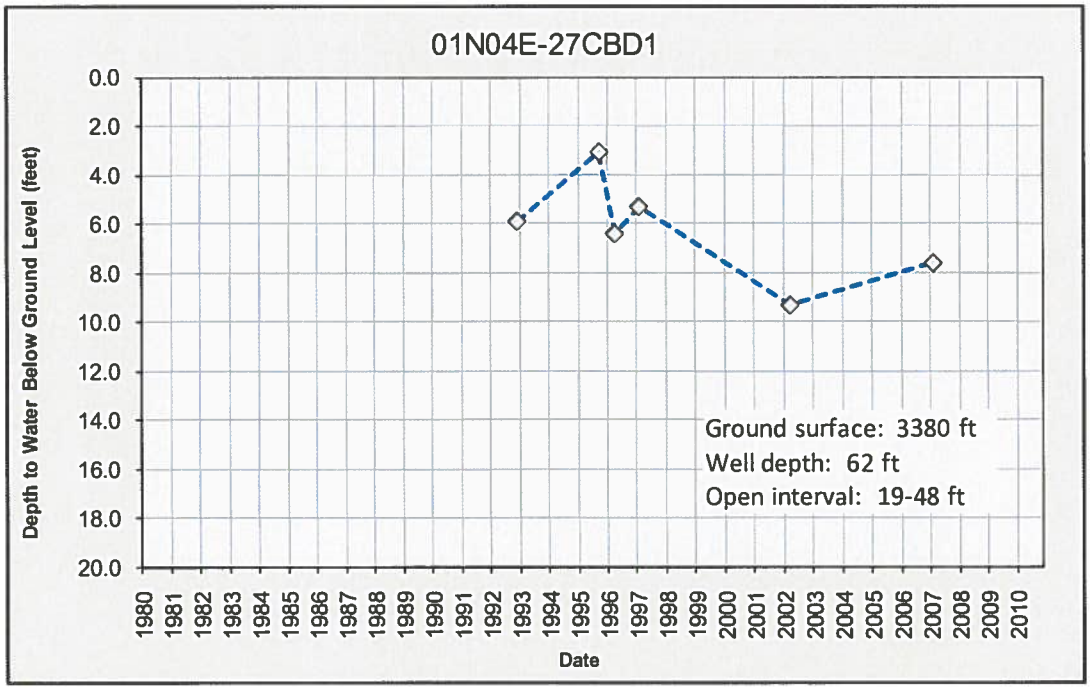

Figure 16. Well 01N04E-27CBD1 (interpreted long-term stable water level).

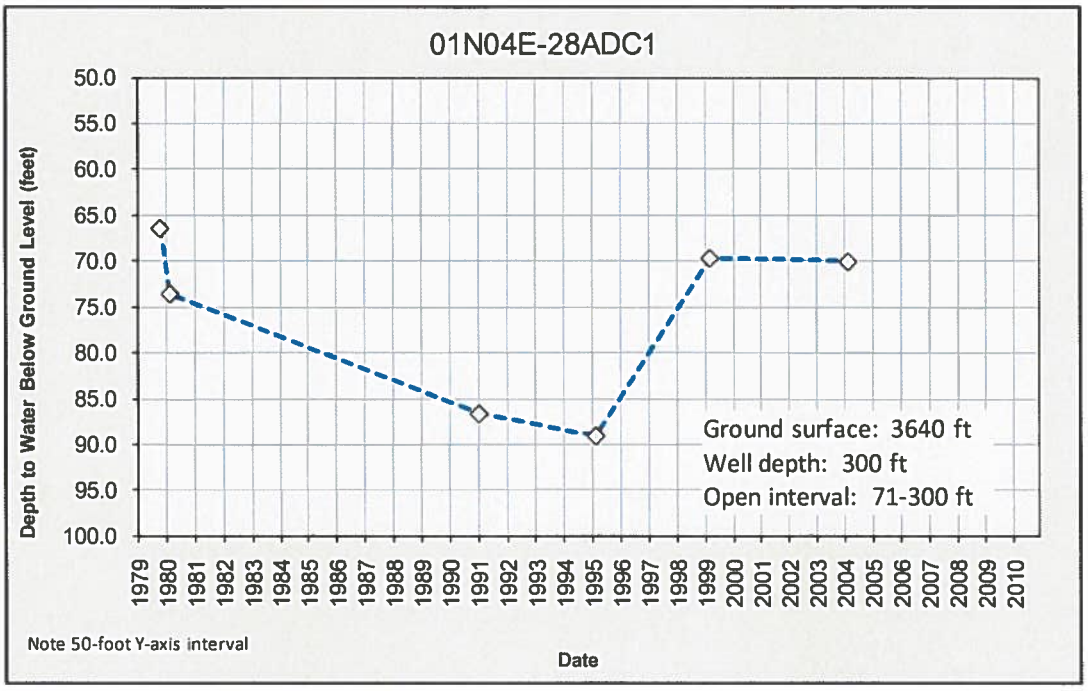

Figure 17. Well 01N04E-28ADC1 (interpreted long-term stable water level).

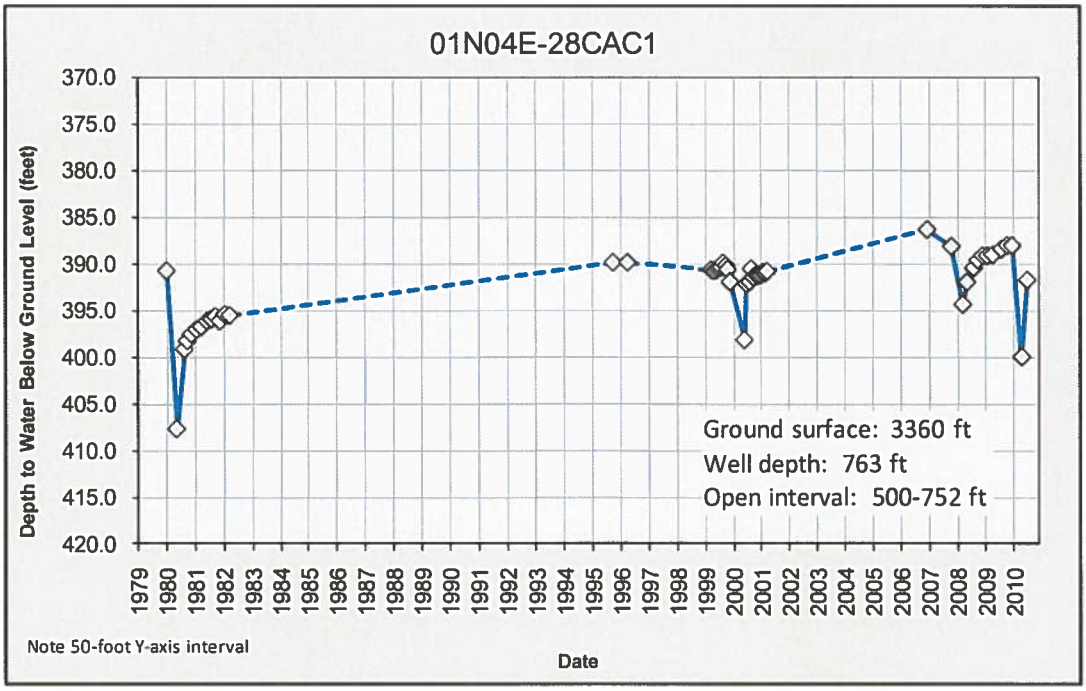

Figure 18. Well 01N04E-28CAC1 (interpreted long-term stable water level).

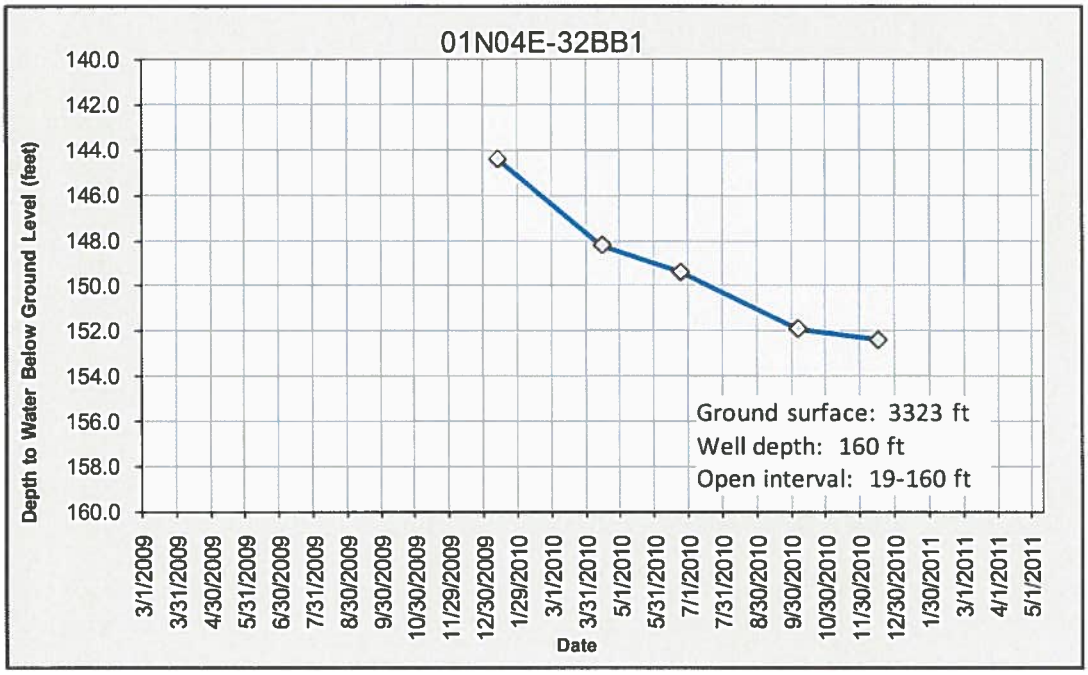

Figure 19. Well 01N04E-32BB1 (interpreted short-term decreasing over water level).

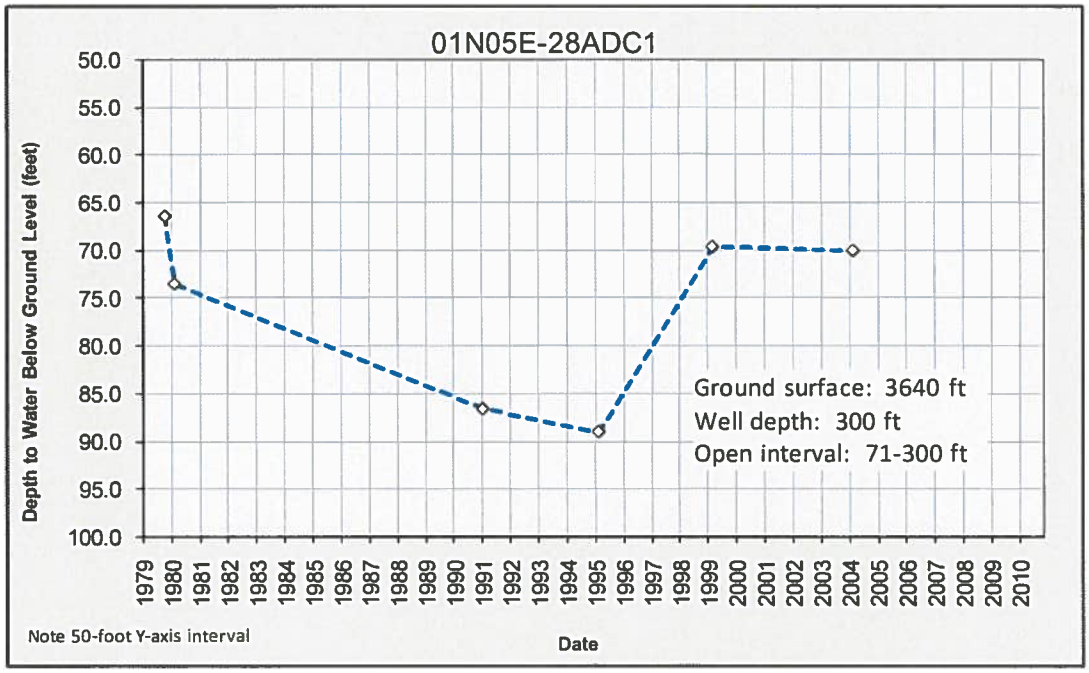

Figure 20. Well 01N05E-28ADC1 (interpreted long-term stable water level).

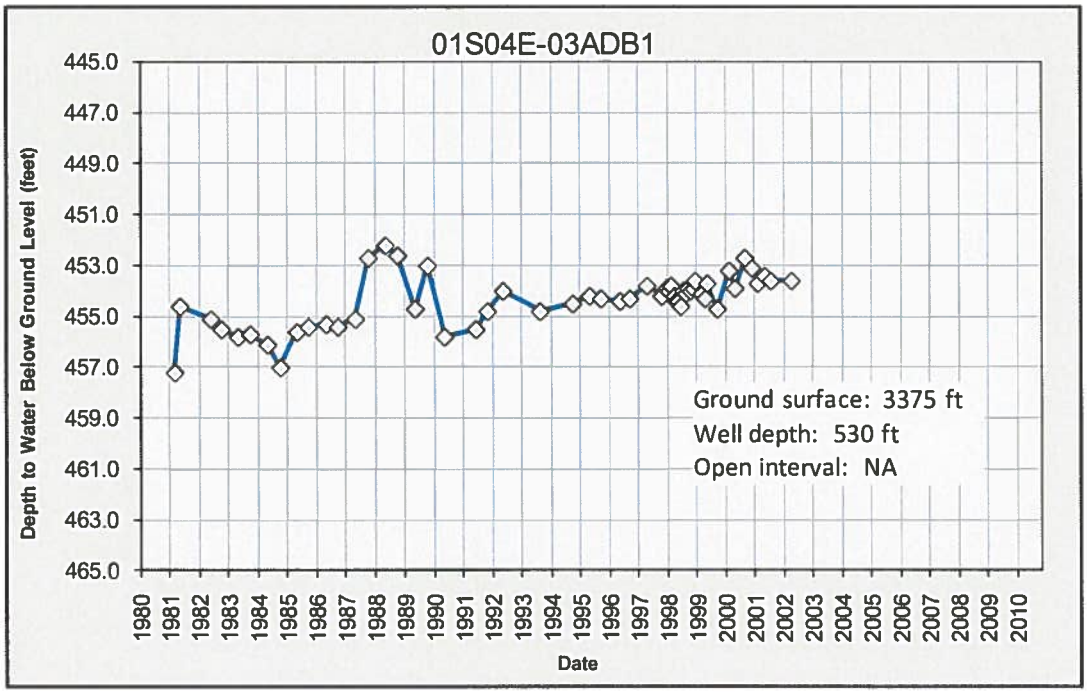

Figure 21. Well 01S04E-03ADB1 (interpreted long-term stable water level).

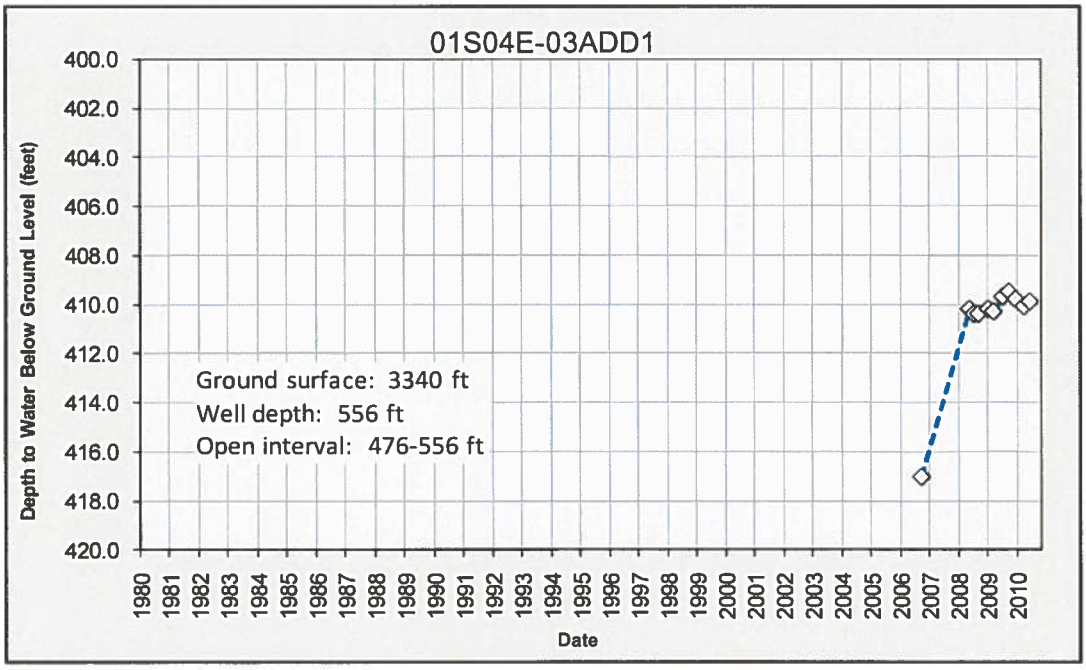

Figure 22. Well 01N04E-03ADD1 (interpreted short-term stable water level).

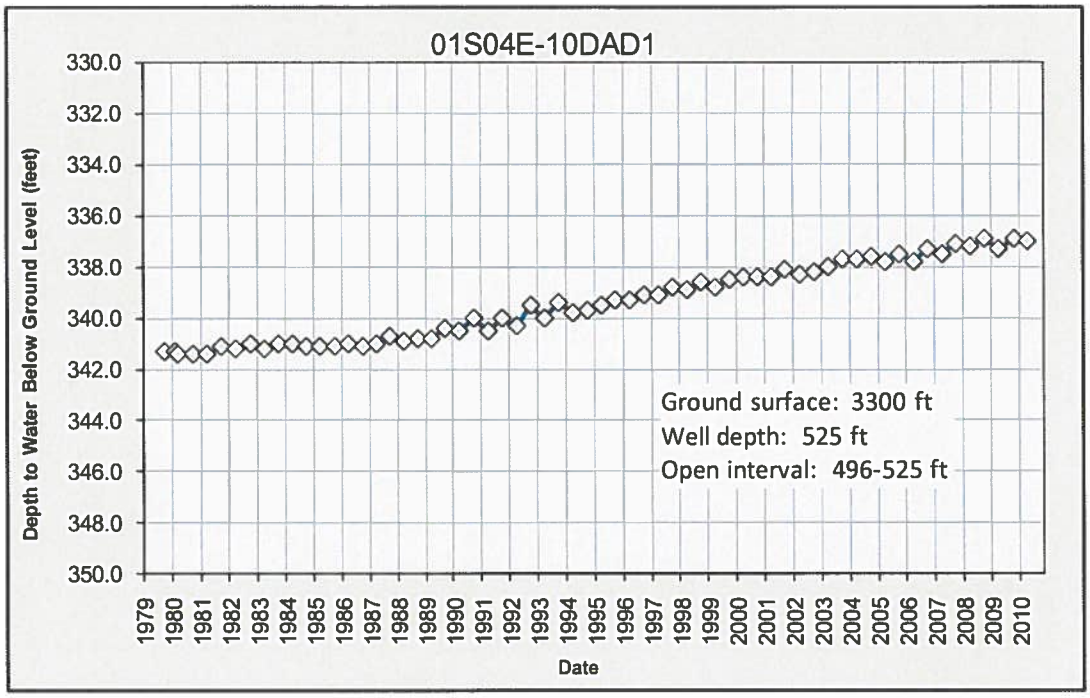

Figure 23. Well 01S04E-10DAD1 (interpreted long-term increasing water level).